NOTE: PIXL Planning (Shared LINKS) will take you to a shared document. I have tried to match as many of them as possible to the Programmes of Study but they do offer a lot of additional information. That you might find useful.

YEAR 1	
CORE SKILLS	***Working Scientifically*** ***During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:*** ***♣ asking simple questions and recognising that they can be answered in different ways*** ***♣ observing closely, using simple equipment*** ***♣ performing simple tests*** ***♣ identifying and classifying*** ***♣ using their observations and ideas to suggest answers to questions*** ***♣ gathering and recording data to help in answering questions*** *Notes and guidance (non-statutory) Pupils in years 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.*
Vocabulary for Talk	guess, explore, test, see/sight, smell, hear, touch, feel, senses.
Vocabulary for Working Scientifically	up/down, near, close to, old(er), new(er), far, further, high(er), above, centre, low(er), underneath, below, equal to, more/less than, larger/smaller, most/least, half, whole area (i.e. non-maths meaning), same/different, point, group, nearly, roughly, position, direction, clockwise, distant, pattern, research, non-fiction, event, question/answer list, tally, table, template, notes, sketch (egg) timer, clock, ruler ,tape measure, metre stick/rule, beaker, scissors, magnifying glass, mirror.
Programme of Study	

Living Things and Their Habitats PIXL PLANNING (SHARED LINK)	
Key Vocabulary	living, alive, dead, move, grow, feed, breathe, shelter, meat eater, plant feeder.
Key Facts	❏ All living things have 7 characteristics in common with regards to life processes : (MRS GREN) Moves, respires, senses, grows, reproduces, excretes and needs nutrition. ❏ A habitat is a natural environment for some animals and plants. ❏ Most living things live in a suitable habitat. Different habitats provide for the basic needs of different plants and animals. ❏ Some animals are adapted to their environments.

Investigate	1. Use the life processes to classify things as being alive, dead or never alive. Develop criteria to work out how we might be able to tell if something is living, dead or was never alive. Test criteria to classify a range of things into groups of 'Living', 'Dead' and 'Never Alive'. 2. Use observations in the local environment to compare animals or through videos and photographs. 3. Look at local habitats such as ponds, hedgerows and soil and discuss in groups what plants and animals might live there. 4. Design and make a bird feeder and observe which birds visit.
Pictures / Diagrams	❏ Group animals according to what they eat. ❏ Make a tally chart, showing the number of animals found in each place. This information could be transferred to a bar chart.
Important People	❏ Terri Irwin
Plants **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	leaf/leaves, flower/blossom, trunk, branch, stem, stalk, petal, root, soil, fruit, berry, seed, bulb, food.
Key Facts	❏ Healthy plants need water, light, soil and warmth. ❏ Plants grow in different places.

	❏ A wild plant is a plant that has grown in the wild with very little help from humans. A garden plant is a plant grown in a garden and looked after by humans. A flowering plant is a plant that produces flowers. ❏ A leaf is the part of the plant that makes food. A petal is one of the soft, colourful parts of a flower. A fruit is where seeds can be found in a flowering plant. A root is the part of a plant that grows underground, gets water from the ground, and holds the plant in place. A bulb is a rounded part of some plants that is under the ground and that grows into a new plant. A seed is a small object made by a plant from which a new plant can grow.
Investigate	1. Go on a walk around the school to look at the plants or provide them with a variety of samples and use identification charts or websites to work out which plants they have: 2. Match and sort flowers based on where they can be found. 3. Sketch observational drawings of flowers. 4. make casts of different barks, using plasticine initially then Plaster of Paris mix (be aware of H&S issues with Plaster of Paris). Encourage the children 5. to describe the texture and colours of the bark.
Pictures / Diagrams	❏ Draw and label the basic parts of a flower (see vocabulary). ❏ Match pictures/samples of flowers with names.

	❏ Keep a large floor book to collect 'evidence' of the plants e.g. photos of trees/plants in different seasons/over a period of time, record details about where they found the plants. Agree a list of facts that children should include in their description, e.g. colour of flower, shape of leaves, number of petals, etc. ❏ Compare and contrast some plants-colour, shape of leaves, number of petals, how tall do they grow, where are they found, etc. ❏ Children construct their own identification chart using leaves from trees. ❏ Look closely at plants using a magnifying glass. Make some careful drawings showing the details of the different parts. What can they see? Why can't they see the same with our bare eyes? ❏ Create a model plant using a variety of materials from the box. Children explain what each item represents as they construct the plant.
Important People	❏ Jeanne Baret ❏ Beatrix Potter

Animals Including Humans

PIXL PLANNING (SHARED LINK)

Key Vocabulary	common animals, wild, tame,pets, fish, bird, reptile, baby, cub, pup, nest, family, egg, mouth, neck, eyes, teeth, wing, claw, tail, beak, fur, feather, fin, scales.
Key Facts	❏ Vertebrates are animals that have a backbone. There are five groups of vertebrates: mammals, fish, birds, reptiles & amphibians ❏ Mammals give birth to live young, usually have hair or fur, warm-blooded & cannot breathe underwater. ❏ Fish have fins and scales, breathe underwater using gills, lay eggs in water & are cold-blooded. ❏ Birds are warm-blooded, have wings and beaks, have feathers & lay eggs. ❏ Reptiles are cold-blooded, lay eggs, have scales & cannot breathe underwater. ❏ Amphibians are cold-blooded, lay eggs, live on land and water and can breathe underwater through gills. ❏ Invertebrates are animals that do not have a backbone.
Investigate	1. Describe how to identify and group animals. 2. Research how to take care of animals taken from the local environment and how to return them safely.
Pictures / Diagrams	❏ Use hoops to sort animals. ❏ Compare skeletons of different animals. Children should make detailed observational drawings of the bones – which can then be annotated. ❏ Find different ways of sorting them into groups. They might decide on: number of legs, size, where it lives, etc. ❏ Teach children the words: carnivore, herbivore and omnivore. ❏ Ask children to sort animals into a Venn diagram. ❏ Identify similarities and differences. Begin to think about ways to compare animals e.g.: the structure of their bodies, what they eat and where they live. Some children pupils may know how to describe animals by their class such as mammals, birds or reptiles.
Important People	❏ Steve Irwin

Health **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	exercise, taste, meat, fish, sugar, sweet, salt(y).

Key Facts	❑ We have five senses: smell, taste, touch, see & hear. ❑ Hair helps to protect our skull. The skull is the bone that protects our brain. ❑ Eyes help us see ❑ Ears help us hear ❑ Mouth to eat and talk. ❑ Tongues help us taste and teeth ❑ Shoulders help our arms to lift up ❑ Hands help us grab things and write ❑ Knees help us bend our legs ❑ Feet help us stay balanced and upright. ❑ Elbows help our arms to bend ❑ Neck connects the head to the rest of the body ❑ Nose helps us smell ❑ Eyebrows protect our eyes
Investigate	1. Complete a simple exercise (such as a star jump) and describe which parts of your body move. 2. Participate in a sensory experience where you taste, feel, look at and see different foods (check for allergies first). 3. Use senses to compare different textures, sounds and smells. 4. Discuss activities where you might use more than one sense (e.g. playing football). 5. Conduct a class investigation into the human body. Possible (pattern seeking) investigations: Is height related to shoe size/foot length? Do the tallest people have the biggest head circumference? Is there a link between hand span and foot length? Are the tallest children the oldest in the class? Is height related to leg length? Is there a link between height and arm length? 6. Explore each of the senses through related activities: Touch table – place items in feely bags and the children write on white boards what they think they are. Sight table – look at different items with magnifying glasses. Have a central piece of paper to write down some interesting describing words. Taste table – have different plates of crisps. Number the plates and ask the children to write down on whiteboards which flavour each numbered plate is. Smell – have pots of different smelling items, covered with holes. Children match the labels to the correct pots. Sound –have opaque pots filled with different objects. The children shake the pots and try and guess which objects are inside.

Pictures / Diagrams	❏ Label the different parts of the body and describe what each part does. ❏ Draw around one of the pupils in your class using chalk - label the different parts of the body. ❏ classify food/food pictures into groups and explain how/why they chose those groups. Compare these to the 5 food groups and explain that food is put into these groups because they give your body different things that it needs. Can they re-organise the food into a pyramid from the bottom

	(foods they should eat more of) to the top (food they should eat less of). Compare this to the food pyramid. ❏ Record a food-diary and review their diet. They could survey the class and collect and present data about favourite foods. ❏ Try out different physical activities thinking about how the activities make their bodies feel considering the question - When you exercise, what feels different to before?
Important People	❏ BBC Teach - Proud to be a Doctor
Materials **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	object, material,wood, plastic, glass, metal, water, rock, rough, smooth, bright/shiny, cloudy, dull/dim, strong/weak, waterproof, bendy/stiff, soft/hard, see-through, melt, freeze, boil, burn.
Key Facts	❏ Objects are things that you can touch or see. Objects are made from materials, e.g. glass, metal, paper, wood, water, rock, plastic, fabrics, elastic and foil. ❏ Words used to describe materials are: transparent, waterproof, opaque, stiff, soft, shiny, rough, absorbent, bright, bendy, stretchy, hard, smooth and dull. ❏ Some materials are natural while others are man -made. Natural materials are materials which are found in nature. Man-made materials are materials which have been produced by humans.
Investigate	1. How are objects similar / different based on the materials they are made from? 2. How are materials similar / different to each other? 3. What is the best material for an umbrella? 4. What is the best material for lining a dog basket? 5. What is the best material for a superhero costume?

	6. What is the best material for curtains? 7. What is the best material for a bookshelf?
Pictures / Diagrams	❑ Can you sort natural materials from man-made materials?
Important People	❑ Jamie Garcia
Sound, Light, Earth and Space (Seasonal Changes) **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	weather, hot, cold, wind, rain, snow, ice, rain gauge, wind sock, wind vane, seasons (autumn winter spring summer), day, length, month, year, light, dark(ness), shadow, bright/dim, sun(light), moon, movement, rainbow.
Key Facts	❑ There are four seasons: Autumn is September to November; Winter is December to February; Spring is March to May & Summer is June to August. ❑ **Autumn:** temperature begins to fall (colder), leaves on deciduous trees change colour and begin to fall, the days get shorter and the nights get longer, the weather may be slightly sunny, windy or rainy & there are more clouds in the sky during autumn compared to the summer. ❑ **Winter:** it gets colder still because the temperature has fallen; it can freeze overnight and in the mornings there may be ice and frost; deciduous trees have completely lost their leaves and the branches are bare; the days get shorter and the nights get longer; it has the shortest days and the longest nights of all the seasons; the weather may be windy, rainy and chilly; sometimes it also snows. ❑ **Spring:** it gets warmer and the temperature begins to rise; leaves begin to appear on deciduous trees; some trees begin to blossom; many plants begin to grow; lambs are born and chicks begin to hatch; the days become longer and the nights become shorter; the weather may be slightly sunny but still a little windy and rainy on some days. ❑ **Summer:** it gets warmer still because the temperature has risen; the days get longer and the nights get shorter; summer has the longest days and the shortest nights of all the seasons; the weather may be hot and sunny and there may not be many clouds in the sky.
Investigate	1. Measure the temperature every day - what do you notice about the difference in temperature from the start of the unit to the end? 2. Discuss what happens when the children go home from school in the spring and summer - what do they notice about daylight? Compare this to what happens in the winter. 3. Analyse simple graphs that show how day length changes throughout the seasons. 4. Conduct surveys about what happens to nature in the different seasons. 5. Focusing on the behaviour of animals during each season children look to see what changes some animals make during different season and why 6. these happen e.g. Coat colour and thickness, hibernation & feeding patterns
Pictures / Diagrams	❑ Go on a spring nature walk - what signs of spring can you spot? Make simple sketches. Sort events, clothing & actions according to the season.

	❑ Order the months on a timeline then establish which season they belong to. ❑ Match events to the seasons they happen in? What is weather like during these events (e.g. Easter, summer holidays) ❑ Gather weather data over a period of time and use it to create a pictogram. They could create questions about their data and answer questions about others. ❑ Measure the wind by: Making an anemometer to find out how much wind is there in different seasons or by blowing bubbles and time how fast they travel in different seasons. ❑ Measure rainfall by making a rain gauge. Children record the amount of rain fallen on different days throughout the year. At the end of the year they could examine this data and record the driest and wettest days in the year.
Important People	❑ BBC Go Jetters

YEAR 2	
CORE SKILLS	***Working Scientifically*** ***During years 1 and 2, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:*** ***♣ asking simple questions and recognising that they can be answered in different ways*** ***♣ observing closely, using simple equipment*** ***♣ performing simple tests*** ***♣ identifying and classifying*** ***♣ using their observations and ideas to suggest answers to questions*** ***♣ gathering and recording data to help in answering questions*** *Notes and guidance (non-statutory) Pupils in years 1 and 2 should explore the world around them and raise their own questions. They should experience different types of scientific enquiries, including practical activities, and begin to recognise ways in which they might answer scientific questions. They should use simple features to compare objects, materials and living things and, with help, decide how to sort and group them, observe changes over time, and, with guidance, they should begin to notice patterns and relationships. They should ask people questions and use simple secondary sources to find answers. They should use simple measurements and equipment (for example, hand lenses, egg timers) to gather data, carry out simple tests, record simple data, and talk about what they have found out and how they found it out. With help, they should record and communicate their findings in a range of ways and begin to use simple scientific language.*
Vocabulary for Talk	gather, collect, notice, link, describe, predict, result, conclude, contrast, order, value, rank, sort

Vocabulary for Working Scientifically	left, right, beyond, represents, stands for, exact(ly), nearest, distance, contains, property, appearance, similarity, difference, symmetrical, fractions, amount, scale, fair test, document, strategy.record(ing), pictogram, tally chart, block diagram, Venn diagram, jottings, plan . equipment, stop-watch, pipette, beaker, syringe, weight, thermometer, measuring scales, tube, tweezer, net, set square, insect viewer, pooter.
Programme of Study	
Living Things and Their Habitats **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	(micro)habitat (and name some eg log, pond) microscopic environment surroundings conditions (and describe eg damp, dark) life cycle food chain food source predator prey variety produce reproduce suited adapted
Key Facts	❏ A habitat is a place where living things, such as animals and plants, can find all of the things they need to survive. This includes food, water, air, space to move and grow and some shelter. Some habitats are large, like the ocean, and some are very small, such as under a log. Some habitats in our local area include the river and woodlands. Other habitats include the coast and the forest. ❏ Microhabitats are very small habitats where minibeasts may live. Examples of microhabitats include under stones, in grass, under fallen leaves and in the soil. Minibeasts that can be found there include worms, snails, ants, centipedes, millipedes, and butterflies and they help to keep the microhabitat healthy. Minibeasts are able to survive in their habitats because they can find the things they need to survive there, such as food and water. For example, caterpillars can survive on leaves as they give them food.

	❏ Animals and plants depend on each other to survive. For example, worms depend on plants because they feed on dead leaves, but plants depend on worms who make the soil healthy by digging holes and allowing air in. Birds also need worms because they eat them. Worms are a source of food for birds. This is called a food chain. If there were no worms, there would be less birds as there would be more competition for food. The soil would not be as healthy without worms. ❏ All living things (or things that were once living) have a part to play in food chains. Without them, other animals and plants may not be able to survive.
Investigate	1. Compare two different habitats and explain what animals and plants can be found there. 2. Compare two different microhabitats. What do you notice about the minibeasts that live in each one? Why do you think that is? Discuss how the minibeasts help keep the microhabitat healthy. 3. Use your knowledge of biomes to describe the types of animals and plants that live there. Match animals and plants to their habitats (e.g. forest, ocean, poles, desert). 4. Answer questions such as ‘Why would a polar bear not survive in the desert?’

Pictures / Diagrams	❏ Observe carefully a microhabitat and sketch the plants you find. Can you find any evidence of plants being eaten? What other living things can you see? Go on a minibeast hunt. What minibeasts can you find? Why can they survive in their habitat? Create a tally chart or pictogram to show your results. Create simple food chains that begin with a plant. Discuss what would happen if one of those living things in a food chain did not exist.
Important People	❏ Chris Packham ❏ Rachel Louise Carson
Plants **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	growth seedling shoot mature healthy wither earth (i.e. soil) nutrients structure function germinate pollination seed dispersal
Key Facts	❏ Plants are living things and require things to grow, e.g. water, warmth, nutrients from soil and light to grow. If they do not have one or more of these things, they may stop growing. ❏ Plants can: move, grow, react to their surroundings (sense), absorb nutrients & reproduce ❏ Many plants provide us with food by bearing fruits which carry their seeds. ❏ When farmers grow plants to provide us with food, these are called crops. ❏ We eat many fruits that contain seeds (including tomatoes!). ❏ We also eat different parts of vegetable plants: root vegetables (carrots, potatoes), stem vegetables (celery, spring onion), leafy vegetables (cabbage, lettuce), flowering vegetables (cauliflower, broccoli) & we eat grains and cereals from plants too (wheat, oats). ❏ Nuts and seeds are also sometimes edible (sesame seeds, pumpkin seeds, peanuts). ❏ Many herbs are also grown to add flavour to foods.
Investigate	1. Sort through pictures to show which things are living, which are dead and things which have never been alive.

	2. Go on a plant/tree hunt. What do you notice about what they look like? What are their features? 3. Plant a bulb or a seed and watch it grow. Record your observations in a diary. Compare the growth of that plant with a plant (using the same bulb or seed) where one of the conditions is different (no water, no light, a smaller container). 4. Plant a seed on a wet cotton bud. Does it grow? Why might it grow for a little while and then stop? 5. Investigate what plants need to grow by putting cress seeds in different conditions. Ask for suggestions – water, light, warmth, air e.g. Seeds on a damp paper towel in the window, seeds on a damp paper towel in a dark cupboard, seeds on a dry paper towel in the window and seeds on a dry paper towel in a dark cupboard. 6. Place germinating seeds in different conditions to identify what they need to germinate and what happens if these aren't provided e.g. growing seeds in the dark, growing seed in the fridge etc.

	7. Dissect a variety of fruits and locate where their seeds are. 8. Eat a variety of vegetables and identify which part of the plant they come from (note: do not taste nuts in school as they are allergens). 9. Use established plants for the children to investigate why plants need water and light to grow and examples of what and why.
Pictures / Diagrams	❑ Use a Venn diagram to sort living, dead and non-living. ❑ Create a bar chart to show how tall your plants are to the nearest cm. ❑ Sequence pictures from seed seedling/sapling plant/tree. ❑ examine a range of seeds and make observations and comparisons. They could classify their seeds according to their own group's criteria. ❑ Compare the seedling and a seed. Discuss how it changes from a seed to a seedling and what the seed needs to do this (germinate). ❑ Record their observations each day, possibly measuring the growth of a plant and also highlighting the concept of a fair test. If possible, take a digital photograph each day of each pupil's plant so that at the end of the experiment, these can be put together to make an animation showing the plant's growth.
Important People	❑ David Bellamy
Animals Including Humans **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	amphibian mammal adult young toddler child teenagerdevelop insect live young brain heart lungs skeleton bones eyebrows wrist ear lobe (etc)
Key Facts	❑ A life cycle is the series of changes that an animal or plant passes through from the beginning of its life until its death. ❑ Animals, including humans, have offspring which grow into adults. ❑ All animals need water, air and food to survive.
Investigate	1. Compare and contrast offspring to their parents. 2. Compare the heights/hand spans of people at different stages of their lives. 3. Investigate how animals are cared for in zoos and farms. 4. Research animal charities, such as the RSPCA, and how they keep animals safe.

Pictures / Diagrams	❏ Match animals to their offspring ❏ Order the stages in human life. ❏ Write an instruction text about how to look after pets.
Important People	❏ James Herriot
Health **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	balanced diet fat sugars starch vegetable seafood grains beans dairy nuts lifestyle activity heart rate pulse medicine germ
Key Facts	❏ To keep healthy, humans need: to eat a balanced diet and healthy food, some exercise to keep their muscles and bones healthy, to take medicines that are given by doctors and nurses when feeling poorly & to keep good hygiene by washing regularly, having clean clothes, brushing teeth and hair.
Investigate	1. Participate in a series of exercises and investigate how each exercise: makes your body feel, affects your breathing and uses each of your muscles. Record your findings using charts and diagrams. 2. Children set up a comparative test to investigate the range of movements at different points around their bodies or the muscles you use everyday 3. 4.
Pictures / Diagrams	❏ Record a food diary and evaluate your diet. ❏ Collect information about favourite foods and present it in a pictogram or bar chart. ❏ Identify and classify the four food types on the healthy eating plate (carbohydrates, proteins, fats, vitamins and minerals) and write an explanation about how they help our bodies in different ways. ❏ Gather, record, classify and present data in a variety of ways to help answer the question - What is the ultimate healthy meal? ❏ Gather, record and present their findings to answer the question - What are the similarities and differences in the food people eat around the world, with regards to the type and amount of nutrition? Explain to children that their challenge will be to investigate: Is one healthier than another? ❏
Important People	Joe Wicks - Body Coach

Materials PIXL PLANNING (SHARED LINK)	
Key Vocabulary	man-made natural suitable useful function purpose property rust transparent reflection rigid flexible solid liquid molten gas boiling point heat

	pressure
Key Facts	❏ Materials are used for different purposes based on their properties. For example, wood is used to make furniture and floors. Metal can be used to make coins, cans, cars and cutlery. Glass can be used to make windows. ❏ Glass can be used to make windows because it is transparent. ❏ Rulers can be made from wood, plastic or rubber because these materials are smooth and can be cut straight. ❏ Spoons are made from metal, because it is waterproof and can be cleaned easily. They can also be made from plastic for children because plastic is light and it cannot hurt children's growing teeth. ❏ The shape of some materials can be changed when they are stretched, twisted, bent and squashed.
Investigate	1. Provide children with examples of objects can be made from more than one material e.g. a window can be glass or it can be plastic. Ask children to think of some more examples of objects that can be made from more than one material. Ask them to justify which they think is best and why. 2. Provide the children with opportunities to test properties of different items. Get them to test if they are magnetic, transparent, can float or can be squashed or stretched. 3. Children could look at a range of materials and their properties to choose the right material for different situations. 4. Pose a range of other questions and discuss the children's decision, e.g. Why wouldn't we make clothes out of metal material? 5. Using the story of the three little pigs, children could build the three little pig's houses and talk about which one best suits the purpose and why. 6. Provide children with a collection of metal objects (brass, steel, iron, copper, tin and aluminium) and ask the children to group them into magnetic and non-magnetic metals using a magnet. Children could further explore what they think they could use each metal for. 7. Using planks of wood covered in different materials, let children investigate what happens when they let a toy car go down a ramp covered in rough and smooth materials. 8. Using the story of Humpty Dumpty, investigate which material would be the best one to protect an egg from breaking. 9. Make goo using salt, plain flour, water and cooking oil to make their own stretchy material. Ask them to make a variety of shapes by twisting, stretching, bending or squashing the material.

Pictures / Diagrams	❏ Compare the uses of everyday materials in and around the school with materials found in other places (at home, the journey to school, on visits, and in stories, rhymes and songs) and sort using a Venn diagram. Make jottings of your observations.
Important People	❏ John Dunlop ❏ Charles Macintosh ❏ John McAdam

Sound, Light, Earth and Space
PIXL PLANNING (SHARED LINK)

Key Vocabulary	vegetation seasonal daily (weekly monthly etc) fortnight January, February (etc) poles equator temperature transparent, environment
Key Facts	❏ Environment refers to our planet which provides everything that we and all living things need. ❏ Climate is the weather and the Earth's climate is just right, meaning that things can live on the planet. ❏ Climate change is a change in the overall weather and temperature on Earth. ❏ The Earth is getting warmer due to some of the things humans are doing. This means it will be more difficult for living things to survive. ❏ Greenhouse gases are special types of gas in the atmosphere. They let sunlight through but stop heat from escaping, like a greenhouse, so the Earth warms up. ❏ Magnetic [oles are points on the Earth near the North and South Poles.
Investigate	1. Investigate the impact of climate change through use of videos and photographs. 2. Record changes in the weather. Look at the evidence of the weather around, above and below. 3. Investigate how conditions affect colours, patterns, surfaces, reflections, shapes, sounds or smells. Investigate puddles, plants, behaviour of people and animals. 4. Investigate and record the effects of sunlight, daily temperature changes and shadows in different ways. 5. Research through story, photographs and video, how seasonal weather conditions can influence people, e.g. farmers, fishermen etc.
Pictures / Diagrams	❏ Draw diagrams to show the possible effects of climate change, e.g. floods, droughts, storms, melting ice caps. ❏ Sort and group changes linked to the environment throughout the seasons.

	❏ Draw, photograph, talk or write about observable weather conditions.
Important People	❏ Anders Celsius
Forces **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	elastic electricity mains
Key Facts	❏ Objects move when they are pushed, pulled or twisted. These are all forces. ❏ A push or pull can move an object, start to move, or stop it from moving. ❏ A push or pull can make an object speed up or slow down. ❏ A push or pull can make an object change direction. ❏ A push can squash some materials, and a pull can stretch some materials. ❏ Examples of pulling forces: rowing a boat tug of war archery pulling a sledge, opening a drawer and a slingshot ❏ Examples of pushing forces: running playing hockey playing tennis pushing a door closed, playing piano and pushing a pram
Investigate	1. Observe how different objects move when they are pushed or pulled.
	2. Investigate the forces of pushing and pulling in PE. 3. Observe how different toys move (e.g tricycles, water wheels, pull along toys). 4. Explain how the strength of the force determines how fast or how far something moves.
Pictures / Diagrams	❏ Make a list of everyday activities that involve pushing or pulling objects (e.g. pulling a drawer open or pushing a pram.) ❏ Draw diagrams to show how objects move when a force is applied to it. Use arrows to show the direction of the movement.
Important People	❏ Alexander Graham Bell ❏ John Logie Baird

YEAR 3	
CORE SKILLS	**Working Scientifically** **During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:** **♣ asking relevant questions and using different types of scientific enquiries to answer them** **♣ setting up simple practical enquiries, comparative and fair tests** **♣ making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** **♣ gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** **♣ recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** **♣ reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** **♣ using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** **♣ identifying differences, similarities or changes related to simple scientific ideas and processes** **♣ using straightforward scientific evidence to answer questions or to support their findings.** **Notes and guidance (non-statutory)** They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.
Vocabulary for Talk	estimate ,observe, organise, identify, assume, compare, interpret, disprove, infer, clarify, introduce
Vocabulary for Working Scientifically	corresponding, equivalent, group, positive/negative, area (i.e. maths meaning), parallel, degrees, acute, obtuse, quantity, round up/down, approximate(ly), remainder, data logger, obstacle, outcome, impact, relationship, necessary, evidence, fact/opinion, data, hypothesis, theory, case study, primary/secondary source present findings, abbreviations, frequency table, bar charts, Carroll diagram, flow chart, grid, database, row, column, subdivisions apparatus, hand lens, hour-glass, microscope, measuring cylinder, test-tube, cork stopper, petri dish, gauze, protractor, compass.
Programme of Study	
Living Things and Their Habitats **PIXL PLANNING (SHARED LINK)**	

Key Vocabulary	climate zones vegetation belts (forest, grassland, tundra, desert) climate soil tropical temperate Arctic Circle Antarctic Circle population food web life process producer/consumer herbivore/carnivore/omnivore survive characteristics
Key Facts	❏ A food chain is a simple way to show the direction in which energy moves from the producer to the various consumers to the top or tertiary consumer. The producer (a plant) gets its energy from the Sun. In this example, the producer is the wheat, which gets its energy from the Sun. The mouse eats the wheat and gets its energy from it. The mouse is the primary consumer. The mouse is then eaten by the owl, which is the secondary

	consumer. The owl gets its energy from the mouse. The owl is the predator and the mouse is the prey. The owl is then eaten by the wolf, which is the tertiary consumer. The wolf gets its energy from the owl. ❏ The arrows show the direction in which the energy travels. ❏ A food web shows the direction in which energy travels when animals and producers (plants) are eaten by more than one thing. ❏ A food web shows multiple food chains where there are multiple feeding relationships. ❏ When part of the food chain is removed, this has an impact on the other parts of the food chain. The number of some species will increase, while the population of others will decrease. This can have a direct impact on the survival of the species. ❏ The population of tertiary consumers depends on healthy populations of producers, primary and secondary consumers.
Investigate	1. Investigate which animals are in their local habitat. What do they eat? Construct local food chains. 2. In small groups, give cards with animals from one food chain on them. Each child gets a card, but doesn't look at it. They all put the card on their forehead. Without telling each other what they are, can they get in the right food chain order?
Pictures / Diagrams	❏ Create food chains for different habitats and compare them. How do the producers, predators and prey compare? What are their teeth like? ❏ Create food webs. ❏ Can some of these chains intertwine or overlap? Children investigate and begin to create food webs. ❏ Show a food web to the children without arrows. Can they put the arrows in? What happens if one of the animals dies out. ❏ Identify and classify a range of different animals into appropriate groups by considering their diets e.g. rabbit, cat, horse, badger, dog, chicken, cow, guinea pig, snake, human, based on what they eat.
Important People	❏ Charles H. Turner

Plants PIXL PLANNING (SHARED LINK)	
Key Vocabulary	absorb fertiliser transported pollination seed formation carpel stigma style ovary ovule stamen anther filament sepal pollen
Key Facts	❏ The petals on a flower are usually bright - this is to attract bees and other insects so that they can collect pollen to make seeds. ❏ The seeds are then able to grow to make new plants. This is called germination. ❏ Leaves use carbon dioxide and sunlight to make food for the plant. ❏ The stem carries water and other nutrients from the roots to the rest of the plant. Leaves use this water to make food. ❏ The stem also helps to keep the plant upright so that the sunlight can reach it easier. ❏ The roots help to 'anchor' the plant in the soil. They also absorb water and nutrients from the soil for the stem to carry to the rest of the plant. ❏ Different plants need: air, water, sunlight, nutrients from the soil, room to grow and a suitable temperature. The amount of each of these may vary depending on the type of plant. For example, cacti need less water than other plants. ❏ Water is absorbed from the soil by the roots. It is then transported from the roots to the stem and then to the rest of the plant. ❏ The flower's job is to create seeds so that new plants can grow.

	❏ Pollination occurs when pollen from the anther is transferred to the stigma by bees and other insects. The pollen then travels down and meets the ovule. When this happens, seeds are formed - this is called fertilisation. Seeds are then dispersed so that germination can begin again.
Investigate	1. Compare the effect of different factors in plant growth (e.g. the amount of water, the amount of light and the amount of fertiliser). Discuss what would make this a fair test. 2. Place white carnations in dyed water to observe how plants transport water. 3. Discover how seeds are formed by observing plant life cycles.
Pictures / Diagrams	❏ Dissect fruits to observe their structure and use this to explain how seeds are dispersed. ❏ Dissect a flower and identify each of the different parts that help with fertilisation. ❏ Draw and label the life cycle of a plant. Draw a diagram to show the germination process.
Important People	❏ Jane Colden
Animals Including Humans PIXL PLANNING (SHARED LINK)	

Key Vocabulary	(in)vertebrates offspring survival childhood/babyhood/adulthood brain heart vein/artery skull ribs spine/backbone joints sockets bones muscles contraction tendons windpipe
Key Facts	❏ Vertebrates are animals that have a backbone. These skeletons are called endoskeletons - this means that the skeletons are on the inside of the bodies. These skeletons grow with the bodies. ❏ When the skeleton exists outside the body, it is called an exoskeleton. An exoskeleton is a covering that supports and protects animals. These have to be shed and a new skeleton is grown. ❏ The three most important things a skeleton does are: provide support and shape to an animal's body, allow movement through the joints & protect organs (e.g. the skull protects the brain) ❏ Joints are where bones meet - they allow our bodies to move. ❏ Muscles contract and relax. If you place an elbow on a desk and lift your arm up, muscles in your upper arm (biceps) contract while muscles behind the upper arm (triceps) relax. The muscles work together and in opposition to allow your arm to move. Muscles are connected to bones by tendons.
Investigate	1. Identify and group animals with and without skeletons and compare the ways in which they move. 2. Match animals to their skeletons and explain your reasons for this. 3. Explore ideas about what would happen if humans did not have skeletons. 4. Identify which bones are used for support (e.g. backbone), which are used for protection (e.g. cranium) and which are used for movement (e.g. joints). 5. Create a presentation to show how muscles contract and relax. 6. Compare the size of straight arms and bent arms.Measure around the top of an arm when it is straight and when it is bent . What do you notice?

Pictures / Diagrams	❏ Create a presentation to show how muscles contract and relax. ❏ Draw and label the parts of a skeleton. ❏ Record and present data using tables and bar charts.
Important People	❏ Roger Arliner Young
Health **PIXL PLANNING (SHARED LINK)**	

Key Vocabulary	dietary nutrition food groups protein fibre carbohydrate starches minerals protection x-ray hygiene infection bacteria virus
Key Facts	❑ Humans cannot make their own food like plants do - we need to eat plants and animals to get our energy. ❑ Healthy, balanced diets lead to healthy, active people. ❑ The different food types are: Fruit and vegetables; bread, rice, potatoes, pasta and other starchy foods; milk and dairy; oils and spreads; meat, fish, eggs, beans and other non-dairy sources of protein. ❑ Protein helps your body to grow and repair itself, examples include red meat, yogurt, beans ❑ Carbohydrates give you energy, examples include bread, potatoes, pasta ❑ Fats give you energy, examples include nuts, oils, avocados ❑ Vitamins keep your body healthy, examples of foods high in vitamins include oranges, carrots and nuts ❑ Minerals keep your body healthy, examples of foods high in vitamins include milk, sweetcorn, spinach ❑ Fibre helps you to digest the food that you have eaten, examples of foods high in fibre include whole grain bread, cereals and lentils ❑ Water helps to move nutrients in your body and get rid of waste that you don't need, examples of foods high in water include celery, cucumber & tomatoes
Investigate	1. Compare and contrast the diets of different animals (including their pets) and decide ways of grouping them according to what they eat. 2. Research how different foods contribute to a varied diet. 3. Learn about how to prepare food hygienically. 4. Write a persuasive advert for healthy foods. 5. Know that some people keep different diets for medical, religious and ethical reasons. 6. Describe what happens if one part is missing from a balanced diet and how some groups of people (e.g. vegetarians) may compensate for that.
Pictures / Diagrams	❑ Design meals based on your research. ❑ Prepare a presentation about the benefits of healthy eating.
Important People	❑ Nicholas Appert

Materials PIXL PLANNING (SHARED LINK)	
Key Vocabulary	artificial organic chemical mineral resources boulder cobble pebble granule sand silt clay slate dissolve marble granite sandstone chalk limestone quartz absorb(ent) porous (im)permeable characteristic fossil grains particles crystals layers texture powder magma lava igneous metamorphic sedimentary opaque translucent surface
Key Facts	❏ There are three types of rocks that are formed naturally. ❏ Igneous: When molten magma cools, igneous rocks are formed. This either cools and forms rocks under the earth's surface, or flows out of erupting volcanoes as lava and may mix with other minerals. Examples include granite and basalt. This type of rock is strong, hard- wearing and non-porous. ❏ Sedimentary: Sometimes, little pieces of rocks that have been weathered can be found at the bottom of lakes, seas and rivers, this is called sediment. Over millions of years, layers of this sediment build up forming sedimentary rocks. Examples include limestone and chalk. Sedimentary rocks are porous and can easily be worn down . ❏ Metamorphic: When some igneous and sedimentary rocks are heated and squeezed (pressured), they form metamorphic rocks. Examples include slate and marble. Metamorphic rocks are strong. Bricks and concrete are not rocks because they are man-made. ❏ Fossils are the remains of prehistoric life. They are usually formed when a living thing (plant or animal) dies and the body is covered up or buried by sediment over tens of thousands of years. ❏ Some fossils are formed when the tough bones and teeth in animals, and the woody part of plants are preserved . ❏ Other fossils are made from imprints in surrounding sedimentary rock such as footprints or imprints from shells. ❏ Fossils tell us about the Earth and about life that existed hundreds of thousands and millions of years ago. ❏ Soil is made from pieces of rock, minerals, decaying plants and water. When rock is broken down into small grains, soil is formed. There are layers of soil: above the soil is leaf litter and recently decaying plants. As the soil becomes deeper, the rock grains become larger until bedrock is reached.
Investigate	1. We found rocks around the school but don't know what they are. How can we create a key to help us identify them? Can you sort them? Using a magnifying glass or a hand lens, make careful observations of rocks to look at a range of rocks to handle a selection of rocks. Model classifying them based on whether they can see crystals or not. Use this to get children to develop their own sorting criteria e.g. colour, texture, grains size etc. 2. Set up tests to compare strength/ hardness and permeability of rocks to identify patterns. Add a few drops of water onto each of the samples of rock. Use magnifying glasses/microscopes to observe at which rocks are the most permeable (allows the water in). 3. How hard are different rocks? Investigate how difficult it is to scratch each of the rocks using: their finger nail, a coin and a nail. Using secondary resources to find out about the Moh scale children will be able to give each of their rocks a rough score from the scale. Use a series of tests to sort and classify materials and physically group the rocks. 4. Provide children with different types of soil (loamy, sandy, silty and clayey). Consider what is in it and possibly how it was formed? Separate different soils with different sized sieves. Compare the masses of the different particles collected through each sieve.

	5. Investigate different soils and compare them to find a relationship between two or more sets of data. Use a range of equipment to collect data e.g. Put a filter paper in each funnel. Put soil in each funnel. See how long the water takes to run through 3 types of soil.
Pictures / Diagrams	❑ Make own keys and branching databases with results ❑ Discuss and record how they have sorted the rocks into groups using scientific knowledge.

	❑ Record what they found out in their own words (explain research using scientific knowledge and understanding) ❑ Presenting information for audience and purpose ❑ Using a map of soil for our area. Can we find any patterns in the places where different soils are found? Is there a pattern in their permeability? Why? ❑ Make records using tables, bar charts or scatter graphs ❑ Use and interpret data collected and recognise patterns in results ❑ Draw conclusions about simple patterns from two sets of data ❑ Talk about patterns using scientific language
Important People	❑ Mary Anning ❑ William Smith
Sound, Light, Earth and Space **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	light source (and names e.g. torch) light wave reflect(ive) mirror block/absorb opaque light beam speed of light emit light spectrum prism lens kaleidoscope solar system phases of moon (new, crescent, quarter, gibbous, wax, wane) sundial
Key Facts	❑ A light source is something that emits light by burning, electricity or chemical reactions. ❑ Burning light sources include the Sun, flames from a fire and stars. ❑ We must never look directly at the Sun as the light produced is very bright and can be harmful to our eyes. This is why we wear sunglasses. ❑ Electric lights include lamps, car headlights and street lights. ❑ Lights that are caused by chemical reactions are much less common. This happens when different chemicals react and light is a product of that reaction. Examples can include glow sticks and fireflies.

	❑ We need light so that we are able to see in the dark. This is because the dark is the absence of light. The Sun and stars always give us light but we can only see the stars when it is dark. At night time we cannot see the Sun's light as the Earth turns and our part of the Earth is not lit up by the Sun at night. When we are driving, we need car headlights or street lights to help us. If we are walking or out in the dark, we would need torches to help us see. You should not look directly into the torch as this is dangerous. ❑ The Moon is not a source of light even though we can see it in the dark. This is because the Sun's light reflects on the surface of the Moon making it appear as though the Moon emits light. ❑ Shiny things are not light sources - they appear to be sources of light as they are bright. ❑ Light travels in straight lines. ❑ When light is blocked by an opaque object, a dark shadow is formed.
Investigate	1. The brightness of torches - can you put torches in order from brightest to dimmest? What would make it a fair test? 2. Why do lights seem brighter in the dark? 3. Explore which objects form shadows when light is shone on them.

	4. How can you change the size and shape of shadows by using the same object? 5. What happens when light is reflected from different surfaces? What happens when light is reflected from a mirror? What happens when the angle of the mirror (or light source changes?) 6. Observe light travelling through water – why do objects look bent/distorted? Children to blow bubbles and observe light travelling through - Explain the concept of white light refraction and the colour spectrum. 7. Model a fair test to investigate how distance from light source affects shadow size. Children compare and record size of shadow against distance from source. Bar graph. Explain why shadow changes with a diagram. 8. Challenge the children to find out if shadows are the same length at different times of the day. Give them a choice of equipment (rulers, string, chalk, rounder's post etc.) Ask them how they are going to record their results? Children in groups carry out their investigation – teacher to do their own with a group that may need support. Share the findings. 9. Place a pole in an area where you will get a good shadow. Record the length of shadow at the same time of day each month of the year. Record using a photograph and chart.
Pictures / Diagrams	❑ Draw and label a diagram to show how shadows are formed. ❑ Sort and group materials based on the criteria: opaque, translucent and transparent. ❑ Sort the light sources into a Venn diagram. They discuss the question 'What is light?' ❑ Children make a note of the light source and the darkness of shadow. ❑

Important People	❏ Maria Telkes ❏ Mae Carol Jemison
Forces **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	force gravity friction spring air resistance streamlined force-meter Newton meter magnet(ic) attract repel compress North/South pole bar/ring/button/horse-shoe magnet iron copper aluminium steel brass nickel
Key Facts	❏ Forces are pushes and pulls. These forces change the motion of an object. They will make it start to move or speed up, slow it down or even make it stop. For example, when a cyclist pushes down on the pedals of a bike, it begins to move. The harder the cyclist pedals, the faster the bike moves. When the cyclist pulls the brakes, the bike slows down and eventually stops. ❏ Forces act in opposite directions to each other. ❏ When an object moves across a surface, friction acts as an opposite force. ❏ Friction is a force that holds back the motion of an object. ❏ Some surfaces create more friction than others which means that objects move across them slower. ❏ On a ramp, the force that causes the object to move downwards is gravity. ❏ Objects move differently depending on the surface of the object itself and the surface of the ramp.

	❏ Magnets produce an area of force around them called a magnetic field. ❏ When objects enter this magnetic field, they will be attracted to or repelled from the magnet if they are magnetic. ❏ When magnets repel, the push each other away ❏ When magnets attract, they pull together. ❏ Objects that are magnetic, are attracted to magnets. ❏ Iron and steel are magnetic. ❏ Aluminium and copper are non-magnetic. ❏ The ends of a magnet are called poles. One end is called the north pole and the other end is called the south pole. ❏ Opposite poles attract, similar poles repel. ❏ If you place two magnets so the south pole of one faces the north pole of the other, the magnets will move towards each other. This is called attraction.

	❑ If you place the magnets so that two of the same poles face each other, the magnets will move away from each other. They are repelling each other.
Investigate	1. Investigate rolling a toy car over different surfaces- measure the distance it travels- which is the best surface? Why didn't the car travel further on the rough surface? 2. investigate statements that are either a push or pull. 3. Investigate how to move objects with a different contact force. 4. Investigate how to move objects with non-contact force (using a magnet to move an object) How far can you move it? 5. Which is the best magnet at moving an object further? 6. Investigation- how much weight can a magnet hold? 7. Investigate using iron filings that show a magnetic field. What happens if we move it? What shapes can you make using the iron filings? 8. Children investigate with different types of magnets and investigate what happens when they put them together. Children to make observations about what they see and feel. 9. Investigate and sort materials like wool, cloth, paper metal into two groups- magnetic or non-magnetic. 10. Investigate how rocks in minerals attract a magnet- how can we investigate this? How can we make it a fair test?
Pictures / Diagrams	❑ Compare how different things move and group them. ❑ Label some materials ❑ Use a microscope to look at materials in detail-describe what they see. ❑ Investigate which materials are magnetic and sort between objects that are magnetic and those that are non-magnetic. ❑ Separate different materials using magnets- How can we separate steel and aluminium pieces using a magnet?
Important People	❑ Oliver and Wilbur Wright
	❑ William Gilbert

YEAR 4	
CORE SKILLS	**Working Scientifically** **During years 3 and 4, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:** **♣ asking relevant questions and using different types of scientific enquiries to answer them** **♣ setting up simple practical enquiries, comparative and fair tests** **♣ making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers** **♣ gathering, recording, classifying and presenting data in a variety of ways to help in answering questions** **♣ recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables** **♣ reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions** **♣ using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions** **♣ identifying differences, similarities or changes related to simple scientific ideas and processes** **♣ using straightforward scientific evidence to answer questions or to support their findings.** **Notes and guidance (non-statutory)** They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences.
Vocabulary for Talk	classify classify categorise hypothesise critique summarise
Vocabulary for Working Scientifically	increase/decrease factor negative numbers base spherical, cylindrical etc - i.e. 3D shape terminology for description concave convex translation rotation origin statistics typical exception unique intricate trend precise accurate comparative systematic convention reliability communicate time graphs 'and other graphs' quantitative/qualitative plot continuous/grouped and discrete data format aquarium Pasteur pipette forceps
Programme of Study	
Living Things and Their Habitats **PIXL PLANNING (SHARED LINK)**	

Key Vocabulary	classification key (in)vertebrates mould fungus organism population deforestation pollution positive/negative human impact variation biome vegetation region dominant environmental anemometer barometer
Key Facts	❑ All living things, which can also be called organisms, have to do certain things to stay alive. These are the life processes: movement, respiration, sensitivity, growth, reproduction, excretion & needs nutrition ❑ Living things can be grouped according to different criteria (where they live, what type of organism they are, what features they have). For example, a camel can belong in a group of vertebrates, a group of animals that live in the desert, and a group of animals that have four legs. ❑ A classification key is a tool that is used to group living things to help us identify them. ❑ Habitats can change throughout the year and this can have an effect on the plants and animals that live there.

	❑ Humans can have positive and negative effects on the environment: positive effects: nature reserves, ecological parks & negative effects: litter, urban development.
Investigate	1. Carefully observe minibeasts in a microhabitat and use a classification key to identify them. 2. Use simple computer software programmes to create a branching classification key. 3. Explore examples of human impact (both positive and negative) on environments.
Pictures / Diagrams	❑ Complete Venn diagrams to show if living things can be grouped into two or more groups . ❑ Use criteria to sort living things in a Carroll diagram. ❑ Sort vertebrate and invertebrate animals into groups, describing their key features. Use a classification key to identify which group of vertebrates animals belong to and then create your own.
Important People	❑ Jane Goodall
Plants **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	tissues pores plant groups (and names eg trees grasses flowering garden wild) deciduous evergreen
Key Facts	❑ A deciduous tree is a tree that loses its leaves every year. ❑ An evergreen tree keeps its leaves throughout the year. ❑ Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses.

	❑ All plants can be divided into groups by looking at the similarities and differences between them. This is called classification. ❑ This process of grouping species so that they may be classified and named is called taxonomy, and scientists who do this are called taxonomists. They organise living things into groups based on: - Anatomy (how it looks)- Genetics (the sequence of its genes)
Investigate	1. Use a selection of images of plants / trees to sort into groups and ask them to explain their reasons. 2. Group living things according to different characteristics, e.g. Discuss protection, e.g. colour, poisons, pattern, spikes etc. 3. Use classification keys (branching databases) to identify plants.
Pictures / Diagrams	❑ Sort plants / trees into a Carroll diagram under headings of their choosing.
Important People	❑ George Washington Carver

Animals Including Humans **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	digestive system digestion saliva oesophagus stomach small/large intestine rectum anus faeces excrete chemical breakdown gastric juices reabsorb reabsorption endoskeleton exoskeleton
Key Facts	❑ The smell of food triggers saliva to be produced. ❑ The digestive system begins with the mouth and teeth where food is ingested and chewed. ❑ Saliva is mixed with the food which helps to break it up. ❑ When the food is small enough to be swallowed, it is pushed down the oesophagus by muscles to the stomach. ❑ In the stomach, food is mixed further. ❑ The mixed food is then sent to the small intestine which absorbs nutrients from the food. ❑ Any leftover broken down food then moves on to the large intestine.

	❑ The food minus the nutrients arrives in the rectum where muscles turn it into faeces. It is stored here until it is pushed out by the anus. This is called excretion.
Investigate	1. Identify the parts of the digestive system and explain their functions.
Pictures / Diagrams	❑ Create a presentation to show how our food is digested. ❑ Draw and label the parts of the digestive system. ❑ Draw and label the journey of the grape. ❑ Construct a set of teeth (In pairs one could do the top, one the bottom set). Next, let them observe each other's teeth – if available using dental mirrors and make changes to their model. ❑ ❑
Important People	❑ Ernest Everett Just
Health **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	dentin plaque pulp-cavity fluoride tooth decay gums nerves enamel canines incisors premolars molars cavities decay
Key Facts	❑ Teeth are used for cutting and chewing food. ❑ They start the digestive process which gives us the energy we need to live. ❑ Humans look after their teeth by brushing and flossing and ensuring that they do not eat foods high in sugar. ❑ Not looking after teeth can lead to an increase in plaque and tooth decay. ❑ Canines are pointed for tearing and ripping food - these are usually used when chewing meat.

	❑ Incisors are shovel shaped and help bite lumps out of and cut food. ❑ Premolars and molars are flat and they grind and crush food.
Investigate	1. Investigate the amount of sugar in drinks and learn how sugar leads to an increase in plaque and how this destroys tooth enamel. 2. Compare the teeth of carnivores, omnivores and herbivores. What do you notice?

	3. Observe pictures of tooth decay. Ask the children what causes tooth decay? Explain how bacteria living on food left in the mouth, release acid that 4. destroys enamel. What drinks can increase the chances of food decay? How can we investigate this? Children to design an investigation that will attempt to test the effects on teeth of different drinks. They will need to come up with something to use for the teeth – they may be able to bring in baby teeth they have kept, or egg shell can be used.
Pictures / Diagrams	❑ Sort a range of foods using hoops and create Venn diagrams provide labels if necessary e.g. energy/growth/repair/protection ❑ Observe skulls of different animals – pictures are ready available on the internet. (Wolves, tigers, sheep, horses, gorillas, humans.) Discuss the differences in their teeth and explore reasons for this.
Important People	❑ Marie M. Daly
Materials **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	manufactured oxygen change of state solidify gaseous water vapour water cycle precipitation evaporation condensation degree Celsius waste sewage
Key Facts	❑ Particles are what materials are made from. They are so small that we cannot see them with our eyes. ❑ The properties of a substance depend on what its particles are like, how they move and how they are arranged. ❑ articles behave differently in solids, liquids and gases. ❑ In the solid state, the material holds its shape. Solids have vibrating particles which are closely packed in and form a regular pattern. This explains the fixed shape of a solid and why it can't be poured. Solids always take up the same amount of space. ❑ In the liquid state, the material holds the shape of the container it is in. This means that liquids can change shape, depending on the container. Liquids have particles which are close together but random. Liquid particles can move over each other. Liquids can be poured. ❑ In the gas state, particles can escape from open containers. Gases have particles which are spread out and move in all directions. ❑ The process by which water on the earth evaporates, then condenses in the atmosphere, and then returns to earth in the form of precipitation, water vapour. ❑ Water in the gaseous state, esp when due to evaporation at a temperature below the boiling point is when the water (in its liquid form) is heated, the particles start to move faster and faster until they have enough energy to move about more freely. The water has evaporated into a water vapour. ❑ When water is cooled, the particles start to slow down until a solid structure (ice) is formed. The water has frozen.

	❑ The temperature at which water turns to ice is called the freezing point. This happens at 0oC.

Investigate	1. What happens to solids when they are heated? Children explore the effect of temperature on substances such as ice, wax, chocolate, butter, cream by using thermometers or data-logging temperature probes. Children make observations and explain their findings using their knowledge of particles. Find out at which temperature each material would begin to melt. Record results in a table and a bar graph. 2. 'Will the location of a puddle/washing/snowman affect how well it evaporates?' Observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line, and investigate the effect of temperature on washing drying or snowmen melting by placing them in different environments of varying temperatures e.g. direct sunlight, shade, fridge, freezer, under lamp to illustrate a fair test investigation. What is being changed?(location i.e. temperature). What is being measured/observed? (How much of the water evaporates in a particular time). How to do it and record their results.
Pictures / Diagrams	❏ Provide children with a range of materials in different states. They must decide whether they are solid, liquid or a gas. They must explain to each other the decisions that they have made. Children record their choices in a Venn diagram (three circles). Provide children with some examples that might go in the part where they overlap e.g. toothpaste, jelly, shaving foam, deodorant. ❏ Draw their own water cycle from what is happening.
Important People	• Bernard Palissy •Satyendra Nath Bose
Sound, Light, Earth and Space **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	sound source wave noise vibrate/vibration pollution pitch volume dynamic echo tuning fork tone muffle mute soundproof Below from Y2 and Y3 music progression; drum guitar instrument families percussion timpani string brass woodwind soprano alto tenor bass

Key Facts	❏ A sound is a thing that can be heard. The object that makes the sound is called the source. ❏ When objects vibrate, a sound is made. ❏ The vibration makes the air around the object vibrate and the air vibrations enter your ear. These are called sound waves. ❏ If an object is making a sound, a part of it is vibrating, even if you cannot see the vibrations. ❏ Sound waves travel through a medium (such as air, water, glass, stone, and brick). For example, if somebody is playing music in the room next door, the sound can travel through the bricks in the wall. ❏ When an object vibrates, the air around it vibrates too. This vibrating air can also be known as sound waves. ❏ The sound waves travel to the ear and make the eardrums vibrate. ❏ Messages are sent to the brain which recognises the vibrations as sounds. ❏ Pitch: the pitch of a sound is how high or low it is. A squeak of mouse has a high pitch. A roar of a lion has a low pitch. ❏ Volume: the volume of a sound is how loud or quiet it is. When a sound is created by a little amount of energy, a weak sound wave is created which doesn't travel far. This makes a quiet sound. A small tap of a hammer is used with small amounts of energy and so creates a quiet noise. A vibration with lots of energy makes a powerful sound wave and therefore a loud sound. A powerful, smashing tap of a hammer is used with lots of

	energy and so creates a loud noise. ❏ Amplitude measures how strong a sound wave is. ❏ Decibels measure how loud a sound is. ❏ Frequency measures the number of times per second that the sound wave cycles.
Investigate	1. Get children to feel the vibrations in their throat as they talk. Get children to observe and feel vibrations. Investigate: cymbals, tuning forks, rice on paper above a drum, forks tied to string and the string wrapped around their ears as they hit the forks against things, guitar strings plucked. Investigate what happens if they hit/pluck harder? 2. Investigate different types of medium connecting string telephones (The examples can already be set up to speed up the investigation) – different makes of string - plastic, wire. Children explain how it is a fair test, what they are observing and what they are changing. Record sound against medium by giving it a ranking or score. This can then be presented in a bar graph. 3. Investigate tightening guitar strings/elastic bands/drum skins - what effect it has on the sound. Comparative conclusion – the tighter the string, the higher the pitch. 4. Investigate plucking a metre ruler so it is over hanging a table at different lengths. Comparative conclusion – the longer the ruler off the table, the lower the sound. Observe how the ruler vibrates when it is longer compared to when it is short. Sellotape a felt tip/white board pen to the end of the ruler. Pluck the ruler and run a piece of paper along the felt tip at the same time. Do this twice – 60cm off the table and 40cm off. Get the children to observe the distance between the waves created and explain how this relates to pitch. Take pictures of results. 5. Make straw kazoos – investigate the different sounds made by different length straws. 6. Investigate tapping bottles filled with varying amounts of water. Could record pitch against water level.

	7. investigate hitting a drum/blowing or plucking an instrument hard and soft. Observe the results – this can be made visual through Audacity. Comparative conclusion: The harder you hit/pluck/blow, the bigger the vibrations and the louder the sound. 8. Investigate plucking a meter ruler, the same length off the table, with different amounts of force. Sellotape a pen to the end and observe the size of the sound wave created. 9. investigate drawing different sound wave patterns and getting friends to sing them back. 10. Plan an investigation that will answer this. Discuss what is being changed and what is being observed. What variables will have to be the same. Children could record levels of volume until silence against distance. Do the same investigation on a windy day. Is there a change in results? Why could this be? 11. Can they find a place on the school grounds where an echo is created? Have they experienced an echo anywhere else? What do they think causes an echo?
Pictures / Diagrams	❏ Draw diagrams and labels to represent: High pitch sounds are created by short sound waves. Low pitched sounds are created by long sound waves. Volume: The closer you are to the source of the sound, the louder the sound will be. The further away you are from the source of the sound, the quieter the sound will be.
Important People	❏ Robert Boyle ❏ Pythagoras

Forces **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	electrical device appliances circuit components conductor resistor symbol cell battery wire bulb switch buzzer motor connection complete/close/open circuit positive/negative crocodile clip alligator clip
Key Facts	❏ Electricity is generated using energy from natural sources such as the Sun, oil, water and wind. These can also be called fuel sources. ❏ Some appliances use batteries and some use mains electricity. ❏ Batteries come in different sizes depending on how much and for how long the appliance is used. ❏ A complete circuit is a loop that allows electrical current to flow through wires. ❏ A circuit contains a battery (cell), wires and an appliance that requires electricity to work (such as a bulb, motor or buzzer). ❏ The electrical current flows through the wires from the battery (cell) to the bulb, motor or buzzer). ❏ A switch can break or reconnect a circuit.

	❏ A switch controls the flow of the electrical current around the circuit. When the switch is off, the current cannot flow. This is not the same as an incomplete circuit. ❏ When objects are placed in the circuits, they may or may not allow electricity to pass through. ❏ Objects that are made from materials that allow electricity to pass through a complete circuit are called electrical conductors. ❏ Objects that are made from materials that do not allow electricity to pass through and do not complete a circuit are called electrical insulators.
Investigate	1. Predict whether a circuit will/will not work from a picture, before creating the circuit. If the circuit is not complete, the children can suggest improvements. These predictions can be explained using scientific concepts. Set up a simple practical enquiry: what does a circuit need to light a bulb? Can you make the circuit needed for a car horn? 2. Set up a simple comparative test in order to explore which materials can be successfully used as a switch in a circuit. An explanation can be written after results are collected, using scientific ideas to identify similarities and differences. 3. Investigations about material choice for a switch can be evaluated using F.A.R. Was it fair? Was it accurate? Was it reliable? 4. Provide children with equipment to explore whether circuits work or not from images. 5. Deconstruct circuits, testing individual components for breaks. Ask the children to find a way in which to do this. 6. Set up a fair test, explaining why it is considered fair for the number of bulbs which can be lit per battery. 7. Children set up a simple comparative test: which materials are electrical conductors? Children should be provided with a range of metals. 8. Children can suggest improvements to their investigation as part of its evaluation. How fair, accurate and reliable were the results collected? Use results to answer a question: what year did pennies stop being made from copper? Set up a practical test to find the best electrical conductor. 9. Children set up a simple comparative test: which materials are electrical conductors? Children should be provided with a range of metals.
Pictures / Diagrams	❏ We found electrical appliances around the school. Can you sort them into groups according to how they are affected by electricity? Ask the children to decide on the best way to record their sorting of electrical appliances. ❏ Record findings with labelled drawings of their circuit (NOTE symbols are not required until upper KS2 when electricity is revisited). Explain each components' role in a circuit. ❏ Draw a labelled drawing of working/broken components. Record findings with labelled drawings.
	❏ Use results to answer a question: what makes a bulb brighter? Children can change the voltage of the battery, number of cells, the length of the wire, or the bulb's position in the circuit for example. Can they explain whether their test was fair or unfair? ❏ Children classify a range of materials into conductors and insulators, deciding upon the best way to record their findings. ❏ Children classify a range of materials into conductors and insulators, deciding upon the best way to record their findings themselves. ❏ Children can suggest improvements to their investigation as part of its evaluation. How fair, accurate and reliable were the results collected?

Important People	❏ Thomas Edison ❏ Garrett Morgan

YEAR 5	
CORE SKILLS	**Working Scientifically** **During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:** **♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** **♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** **♣ using test results to make predictions to set up further comparative and fair tests** **♣ reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** **♣ identifying scientific evidence that has been used to support or refute ideas or arguments** Notes and guidance (non-statutory) Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.
Vocabulary for Talk	refute inform (as in: inform our thinking) generalise verify
Vocabulary for Working Scientifically	percentage distribution causal correlation dependent variable control cancel out imperial (units) maximum/minimum million diagonal reflex angle rotation sparse abundant capacity phenomenon exceptional crucial complex sustain perspective rigorous line graph scatter funnel filter paper graph average mode range sieve
Programme of Study	
Living Things and Their Habitats **PIXL PLANNING (SHARED LINK)**	

Key Vocabulary	sexual and asexual reproduction interdependence topography erosion
Key Facts	❏ The life cycles of mammals, birds, amphibians and insects have similarities and differences. ❏ One difference is that amphibians and insects go through the process of metamorphosis. This is when the structure of their bodies changes significantly as they grow (for example, from tadpole to frog or caterpillar to butterfly).

Investigate	1. Compare the life cycles of mammals, amphibians, insects and birds. What is similar about their life cycles? What is different? 2. Observe life cycle changes in a variety of living things, for example, plants in the vegetable garden or flower border, and animals in the local environment. 3. Compare the life cycles of animals in the local environment with other animals (in the rainforest, in the oceans, in desert areas and in prehistoric times), asking pertinent questions and suggesting reasons for similarities and differences. 4. Worms and snails have both male and female parts. Investigate how they reproduce. 5. Observe the hatching of stick insect eggs, investigating what conditions are optimal for the eggs to hatch. Find out why the majority of stick insects are female and how and why they reproduce predominantly asexually. What other animals can reproduce both sexually and asexually?
Pictures / Diagrams	❏ Draw and label life cycles for mammals, amphibians, insects and birds. ❏ Describe the process of sexual reproduction in a familiar animal such as a dog and use a diagram or model to demonstrate how sexual reproduction can benefit a species through a mixing of genes. ❏ Encourage children to research a variety of pollinators including mammals, amphibians, insects and birds. A few suggested examples to research could include: bats, monkeys, possums, rodents, frogs, honey bees, bumblebees, ants, butterflies, moths, wasps and different species of birds. Discuss what they have found out, comparing and contrasting the life cycles of the different pollinators. ❏ Search the internet to find information and footage of the life cycle of a frog (amphibian) comparing this to the life cycle of a butterfly. Articulate the differences in discussion, diagrams and written work. ❏ Research gestation periods of other animals and compare them to humans. How fast does a human baby grow compared to other animals?
Important People	❏ Alfred Russell Wallace ❏ Jacques Cousteau

Plants **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	seed formation plantlets clone runners transpiration

Key Facts	❏ Reproduction is when an animal or plant produces one or more individuals similar to itself. ❏ Sexual reproduction: requires two parents with male and female gametes (cells) will produce offspring that is similar to but not identical to the parent ❏ Asexual reproduction: will produce offspring that is identical to the parent and requires only one parent. ❏ Male gametes can be found in the pollen. ❏ Female gametes can be found in the ovary (they are called ovules). ❏ Pollination occurs when pollen from the anther is transferred to the stigma by bees and other insects. The pollen then travels down and meets the ovule. When this happens, seeds are formed - this is called fertilisation. Seeds are then dispersed so that germination can begin again. ❏ Some plants, such as daffodils and potatoes, can also produce offspring using asexual reproduction

Investigate	1. Research asexual reproduction and grow strawberry plants in order to see first hand how they use stems to reproduce. 2. Compare the life cycles of plants in the local environment with other plants (in the rainforest, in the oceans, in desert areas and in prehis- 3. toric times), asking pertinent questions and suggesting reasons for similarities and differences. 4. Compare what you already know about David Attenborough, and compare his work to that of Jane Goodall's.
Pictures / Diagrams	❏ Explore and dissect a flowering plant, identifying the structures and key features associated with sexual reproduction such as the carpel, stigma, style, stamen, anthers, filament and pollen. Take photographs at different stages of dissection and place plant parts onto sticky tape. ❏ Explore and dissect a flowering plant, identifying the structures and key features associated with sexual reproduction such as the carpel, stigma, style, stamen, anthers, filament and pollen. Take photographs at different stages of dissection and place plant parts onto sticky tape. ❏ Watch film clips and animations which show and explain how insects such as bees, butterflies and even bats act as pollinators for the sexual reproduction of some plants. Use drawings to sequence this process and use animation or presentation software to retell the process. ❏ Label the different parts and explain their functions.
Important People	❏ David Attenborough David Attenborough (2) ❏ Eva Crane

Animals Including Humans **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	fertilisation birth uterus embryo ovary placenta chromosomes ovum zygote fallopian tubes gestation infancy arachnid mollusc crustacean sponge

Key Facts	❑ A foetus - an unborn animal or human being in the very early stages of development ❑ A newborn - this is a baby that has just been born. ❑ Infancy is a period of rapid change. Many toddlers learn to walk and talk at this stage. ❑ Childhood is when children learn new things as they grow. They become more independent. ❑ Adolescence is when the body starts to change and prepare itself for adulthood. Hormonal changes take place over a few years. This is also known as puberty. ❑ Early adulthood is when humans are usually at their fittest and strongest. ❑ Middle adulthood -is when changes such as hair loss may happen. There are also some hormonal changes again and the ability to reproduce decreases. ❑ Late adulthood is when there is a decline in fitness and strength.
Investigate	1. Collect data around school about height and hand span of different age ranges of pupils. Record the mean, mode and median height of pupils of different ages. Create a graph summarising results. 2. Conduct a fair test to see how our reactions change as we get older. Find out whether age seems to affect reaction time, how and why might this be. Explore whether reaction time is related to other variables.

Pictures / Diagrams	❑ Create a Venn diagram to show what the similarities and differences are between children, adolescents and adults. ❑ Mark on a timeline the stages in the growth and development of humans, matching life stages to ages. (fertilisation, foetal development, birth, baby, toddler, child, teenager, young adult, middle age, old age)
Important People	❑ Dian Fossey (American primatologist and conservationist)
Health	
Key Vocabulary	puberty menstrual cycle penis testes vagina
Key Facts	❑ Puberty is the change that happens in late childhood and adolescence where the body starts to change because of hormones. ❑ Some changes include growth in height, more sweat, hair growth on arms and legs, under the armpits and on genitals, and growth in parts of the body such as male genitals and breasts. ❑ Females begin to menstruate.

Investigate	❏ Investigate through video and photographs how the body changes during puberty and link to timescale.
Pictures / Diagrams	❏ Using male and female body templates, plot changes that can be found on the body during puberty. ❏ Chart different stages of growth on a line graph and analyse.
Important People	❏ Leonardo Da Vinci
Materials **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	soluble solution solute solvent suspension filter mixture residue filtrate separation buoyancy (ir)reversible change conductor thermal insulator insulation combustion reaction
Key Facts	❏ Materials which are good thermal conductors allow heat to move through them easily. ❏ Thermal conductors are used to make items that require heat to travel through them easily, such as a saucepan which requires heat to travel through to cook food. Thermal insulators do not let heat travel through them easily. ❏ Examples of thermal insulators include: woollen clothes and flasks for hot drinks. ❏ Electrical insulators have a high resistance which means that it is hard for electricity to pass through these objects. ❏ Electrical conductors allow electricity to pass through them easily while electrical insulators do not. ❏ When the particles of a solid mix with the particles of a liquid, this is called dissolving. The result is a solution. Materials that dissolve are soluble. Materials that do not dissolve are insoluble. ❏ Some materials can be separated after they have been mixed based on their properties - this is called a reversible change.

	❏ Some methods of separation include the use of a magnet, a filter (for insoluble materials), a sieve (based on the size of the solids) and evaporation. ❏ When a mixture cannot be separated back into the original components, this is called an irreversible change. Examples of this include when materials burn or mixing bicarbonate of soda with vinegar.
Investigate	1. **Dissolving** - MAKING CRYSTALS: Using a beaker of water, a heat source, a crystal substance* and a piece of cotton. Heat a small beaker of water. When boiling, dissolve as much crystal substance as possible. This will make a saturated solution. Hang a piece of cotton with a knot in the end in the solution, and leave to cool. Observe the growth of crystals. Discuss what happens.

2. **Separation:** Provide children with a mixture of: salt + sawdust + paper clips + gravel. Introduce the context for the investigation: Mr Clumsy was moving some supplies at his shop when he slipped and fell. He dropped some of the deliveries on the floor and they got mixed up. He swept up what he could and put it in a bucket. Can you help him separate the different materials again? Children plan the separation techniques they will carry out to separate the mixture. Magnets to separate paper clips * Sieving to separate gravel* Dissolving & Filtering to separate sawdust Evaporation to separate water from salt. * These two processes could be done in any order.
3. **Changes of state** – Making chocolate crispy cakes: Children add heat chocolate (solid). Wait for the chocolate (solid/liquid) to melt. Add breakfast cereal (solid) to the chocolate (liquid). Add the mixture (liquid/solid) into cake cases. Cool mixture (solid) and eat! Give children the opportunity to make predictions as the changes of state at each stage and how the chocolate looks, tastes, feels at each stage to be able to use to give evidence to support or refute that changes of state of state are reversible.
4. Get children to consider the **different properties of materials** that could be used for grouping and classifying. Identify the strengths and weaknesses of particular models. Ask children to identify a way of testing whether materials have the property or not, for each property. Apply scientific knowledge and understanding in the planning of investigations, identifying significant variables and recognising which are independent and which are dependent. Select some properties to test a material and to record what the property means and how they will test it. Collect data, choosing appropriate ranges, numbers and values for measurements and observations.
5. **Chemical reaction 1**- What happens when we mix water with plaster of Paris? Can you separate them? Slowly add water to the plaster of Paris and measure the temperature change with a thermometer. Observe a change in temperature as the heat is released in this reaction as the atoms rearrange to make a new substance. NB significant temperature changes.
6. **Chemical reaction 2** - What happens to egg white when it is heated? Place egg white in a metal tray, above a nightlight holder and candle. Observe any changes to the egg white.
7. **Chemical reaction 3**- What happens when we mix bicarbonate of soda with vinegar? Add different amounts of vinegar to bicarbonate of soda.

   Observe any new substances made
8. **Chemical reaction 4**– What happens to a material when it burns? Safely in foil trays burn small pieces of material e.g. fabric, cotton, wool foods such as Breakfast cereals, cream crackers, pasta, paper, wood. Record how easy it burns, how it changed, what was left after burning. NB Demo burning materials in a safe manner and anything that gives off dark smoke does not burn. Have sand available to stamp out flame.
9. **Reaction 5** - What type of change took place during melting/ cooling processes? Provide children with the opportunity to heat and cool a range of substances e.g. butter cheese, chocolate, wax. Children examine cooled substances in the foil trays. Children should compare the before and after stages of each reaction and use their findings to provide evidence as to what changes occurred and possible new materials made and whether they are **reversible or irreversible.**
10. Which materials go back to their **original state** once heated and which ones don't? Children predict whether changes are reversible or irreversible change for each scenario Children record observations of substances (wax, paper, bread, ice, chocolate, salt water) before and after heating and being left to cool. Children evaluate their predictions.

	11. Desert Island challenge: Give children the challenge of using their knowledge of separation techniques to make dirty water safe to drink using limited resources, as if they were on a desert island. Provide children with a range of resources; night lights, cling film, tape, foil, cloth, cup to collect clean water, made up Muddy water solution (mud, sand, salt and water). Children will filter/sieve the mud from the water using the fabric and evaporate the water and collect the clean condensed water. Children could draw how they set up their equipment. They can use words and arrows to explain what happened over time.
Pictures / Diagrams	❑ Record and present data in an effective and appropriate way. ❑ Choose forms to communicate qualitative data appropriate to the data and the purpose of the communication.
Important People	•Stephanie Kwolek •Albert Einstein
Sound, Light, Earth and Space **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	axis/axes Mercury Venus Mars Jupiter Saturn Uranus Neptune Pluto celestial body spin sphere/spherical rotation elliptical orbit revolve asteroid meteor(ite) comet galaxy light year latitude longitude equator hemisphere prime/Greenwich Meridian time zone
Key Facts	❑ The Earth rotates on its axis anti-clockwise and makes a complete rotation over 24 hours (a day). ❑ This makes it appear as the Sun moves through the sky but the Earth's rotation causes day and night. ❑ Different parts of the Earth experience daylight at different times - this means that it is morning, afternoon and night in different places. This is also the reason why we have time zones. ❑ Because of the Earth's tilt, the poles experience 24 hours of sunlight in the summer, and very few hours of sunlight in the winter. ❑ As the Earth rotates, shadows that are formed change in size and orientation. ❑ Year length and the seasons: The Earth takes 365 and a quarter days to orbit the Sun, because of the extra quarter day it takes to orbit the Sun, every four years on Earth is a leap year! It is the Earth's tilt that causes the seasons. ❑ The Moon orbits the Earth anticlockwise and takes approximately 28 days. ❑ The Moon spins once on its axis every time it orbits Earth. This means that we only see one side of the Moon. ❑ The Moon has different phases depending on where it is in its orbit. ❑ The Moon's gravity causes high and low tides. ❑ There are 8 planets in our Solar System (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune). Pluto is a dwarf planet. They all orbit the Sun, which is a star, and they all have moons.

	❏ The first four planets are relatively small and rocky, while the four outer planets are gas giants (Jupiter and Saturn) or ice giants (Uranus and Neptune). ❏ There are also asteroids, meteoroids and comets in the Solar System. ❏ The Solar System is in a galaxy called the Milky Way. ❏ The galaxy is in the universe.

Investigate	1. Investigate what happens to a toy boat when it moves away from them on a flat surface (table top). Record observations and discuss using scientific vocabulary. 2. Watch a video of a ship sailing away and discuss observations using scientific vocabulary. Compare video of ship to observations of toy boat to decide whether the Earth is flat or spherical and why. 3. Set up an investigation to observe what would happen if Earth was a different 3D shape. Explain events explicitly linking different ideas or models. 4. Using globes, torches, Blu-Tac and Lego people, plan and conduct an investigation about why we have day and night. 5. Make a sundial and investigate by taking repeated measurements each hour and mark times on the sundial. 6. Plan and conduct an experiment to track how the position of the sun in the sky changes over the day. Pupils to track shadows and shadow lengths. Record data in tables/line graphs. 7. Plan and conduct an investigation about why the moon appears to be different shapes at different times of the month. Pupils to record observations.
Pictures / Diagrams	❏ Label and caption diagrams showing which parts are day and night and why. ❏ Label phases of the moon diagram with scientific vocabulary. ❏ Label and caption diagram of the solar system with planet names, arrows to show how they move around the sun and how they rotate and how long it takes each planet to orbit the sun and rotate. ❏ Complete data tables about planets and compare. ❏ Give an unfinished table with sunrise/sunset/day length information for different months of the year in the UK. Complete table using maths knowledge. ❏ Label and caption diagrams showing where the sun would be in the sky at different times of the day. ❏ Use compasses to identify the position of the sun in the sky throughout the day. Record data in a simple table.
Important People	•Galileo Galileo (2) • Katherine Johnson

Forces **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	mechanisms air & water resistance levers pulleys gears cams drag forces transference
Key Facts	❏ Friction is a force - it is the resistance of motion when one object rubs against another. Gravity is the force that pulls objects to the centre of the Earth. ❏ Air resistance pushes up on the parachute, opposing the force of gravity. This makes the parachute land more slowly. ❏ Water resistance is the friction that is created between water and an object that is moving through it. Some objects can move through water with less resistance if they are streamlined. ❏ Levers allow us to do heavy work with less effort . For example, trying to pick up a large heavy box is difficult, however if a lever is used it becomes much easier to move it.
	❏ Pulleys also allow us to do heavy work - objects are attached to ropes and pulley wheels, and so instead of lifting heavy objects upwards, we can pull on the pulley rope downwards. ❏ Gears are toothed wheels. Their 'teeth' can fit into each other so that when the first wheel turns, so does the next one. This allows forces to move across a surface. ❏ Springs can be stretched by pulling them or squashed by pushing them. The greater the force pulling or pushing the spring, the greater the force the spring uses to move back to its normal shape.
Investigate	1. Conduct a fair test to see how our reactions change as we get older. Find out whether age seems to affect reaction time, how and why might this be. Explore whether reaction time is related to other variables. 2. Investigate different objects falling at the same height- time 3. Plan to investigate, taking into account those variables that cannot be controlled, and include ways of minimising the effect of these. 4. Investigate mass of an object and the force of gravity upon it. 5. Investigate the weight of an object and how it falls to the Earth- compare. Use feather, ball, pencil, balloon 6. Investigate air resistance by running with a piece of paper in front of them- explain this is air resistance that they feel. Use different sizes- does this have a different effect? What happens? Run with the piece of paper on top of their head- does it feel different? Did it affect your speed? 7. Investigate surface area and how this affects the rate of falling objects- use the same mass with a different parachutes Predict what will happen? How can you make this a fair test? Change the value of the independent variable in their plan and explain why they chose a particular range and number so that they could collect enough data. 8. Investigate how to make simple levers that lift a load- who can make the best lever? Change the material or weight. Comparative testing - In Nepal, farmers must transport tomatoes down the mountain and across the river- how can they take them without squashing?

	9. Make a paper / tin foil boat- investigate boats and water resistance and how to make the best boater using different types of material. Explain any anomalous results using scientific knowledge and understanding. Investigate how to make the best streamlined boat- who can make the best? How far can it travel? Measure the distance and compare in table of results.
Pictures / Diagrams	❑ Research Sir Isaac Newton and theory of Gravity- how did he discover it? Explain how scientists accept or reject each others' ideas and evidence using peer review. ❑
Important People	❑ Isaac Newton ❑ Stephen Hawking

YEAR 6	
CORE SKILLS	**Working Scientifically** **During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:** **♣ planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary** **♣ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate** **♣ recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs** **♣ using test results to make predictions to set up further comparative and fair tests** **♣ reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations** **♣ identifying scientific evidence that has been used to support or refute ideas or arguments** Notes and guidance (non-statutory) Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be

	most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time.
Vocabulary for Talk	determine attribute analyse corroborate discern epitomise characterise extrapolate
Vocabulary for Working Scientifically	recurring proportion ratio radius diameter circumference concentric arc intersecting plane cross-section appropriate accuracy degree of trust robust authentic plausible controversy stance bias tertiary source pie charts mean four quadrants
Programme of Study	
Living Things and Their Habitats **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	(micro)organism species microbes evolution evolutionary change natural selection adaptation competition genes (dominant /recessive) DNA chromosomes inherit(ance) survival of the fittest fossil records
Key Facts	❑ Living things can be grouped according to different criteria (where they live, what type of organism they are, what features they have). For example, a camel can belong in a group of vertebrates, a group of animals that live in the desert, and a group of animals that have four legs. ❑ A classification key is a tool that is used to group living things to help us identify them using recognisable characteristics. ❑ The Linnaean system, named after Carl Linnaeus, has different levels where the number of living things in each group gets smaller and smaller, until there will just be one type of animal in the species group.

	❏ Microorganisms are very tiny organisms where a microscope has to be used to see them. ❏ Examples of microorganisms include dust mites, bacteria and fungi, such as mould. ❏ Some microorganisms can be helpful in certain situations. Others can be harmful, and their spread needs to be controlled or contained.
Investigate	1. Sort vertebrate and invertebrate animals into groups, describing their key features. Explore the different ways in which invertebrates can be classified (e.g. arachnids, insects, molluscs). 2. Describe some organisms that may be difficult to classify (e.g. platypus) and explain why. 3. Use simple computer software programmes to create a branching classification key. 4. Sort scenarios where microorganisms might be helpful (e.g. yeast in baking) or harmful; (e.g. infectious diseases). 5. Research unfamiliar organisms from a broad range of other habitats and decide where they belong in the classification system. 6. Research the work of Carl Linnaeus.
Pictures / Diagrams	❏ Use a classification key to identify which group of vertebrates animals belong to and then create your own. ❏ Use classification systems and keys to identify some organisms in the immediate environment. Record these in a variety of ways (e.g. Venn and Carroll diagrams, tables) ❏ Match the vertebrate with the skeleton & match the invertebrate with an X-ray ❏ Use secondary resources to find information about Protists, Bacteria and Fungi
Important People	❏ Louis Pasteur ❏ Edward Jenner
Plants **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	variegated
Key Facts	***Revise key facts from KS2 prior learning.***

Investigate	1. Investigate the classification system in more detail by looking at how broader groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify plants. 2. Investigate things that are items that were once alive- living, non-living and were once alive- discussion into wood from trees 3. Mould investigation- where is the best place to grow our own mould? What conditions do we need to grow the mould? Children can make observations of mould using a microscope 4. Yeast investigation- the best conditions for yeast- measure carbon dioxide output. What happens if we add too much yeast to bread? investigate 5. Research in more depth reasons why living things are placed in one group and not another. Find out about the significance of the work of scientists such as Carl Linnaeu s, a pioneer of classification. 6. Research unfamiliar plants from a broad range of other habitats and decide where they belong in the classification system.

Pictures / Diagrams	❑ Use and create classification systems and keys to identify some plants in the immediate environment.
Important People	❑ Barbara McClintock ❑ Libbie Hyman
Animals Including Humans **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	circulatory system blood vessels capillaries red/white blood cells plasma haemoglobin clotting respiratory system respire carbon dioxide air sacs (de)oxygenated aerobic ventricles aorta trachea diaphragm bronchi bronchioles alveoli pulmonary vein/artery gaseous exchange drugs carbon monoxide
Key Facts	❑ The circulatory system is the system that moves blood throughout the body. ❑ Blood is a body fluid that carries oxygen and other substances around the body. ❑ Blood vessels are tubes that carry blood through the body. ❑ Oxygen is used to make energy (with food) and is absorbed into the body through the lungs. ❑ Carbon dioxide is a waste product made when the body makes energy. It leaves the body through the lungs. ❑ Lungs are organs in the body used to breathe air in and out. ❑ Diet means the types of food and drink an organism eats. ❑ The circulatory system is made of the heart, lungs and the blood vessels. ❑ Arteries carry oxygenated blood from the heart to the rest of the body. Veins carry deoxygenated blood from the body to the heart.

	❑ Nutrients, oxygen and carbon dioxide are exchanged via the capillaries.
Investigate	1. Investigate blood flow through different size blood vessels by cutting and inserting different sized straws into a plastic cup and filling with red water. Do the cups empty at the same rate? How can this be compared to the structure of the blood vessels. 2. Model the function of platelets by melting gelatine in water until it dissolves, allow to cool, add red food dye. Observe over time the thickening, demonstrating coagulation 3. Plan an investigation to identify if there is a relationship between the type of exercise that you do and the number of heart beats per minute. Decide upon the types of exercise that they will do, how they will measure the number of beats, record their results. using a line graph. Write an explanation taking into account what they think the heart was doing during the different exercises, and why it was doing this. 4. Research deficiency diseases using secondary resources e.g. anaemia, rickets, scurvy 5. Research advertising claims and use information from a variety of secondary sources to find out more e.g. Can too much salt be harmful? Are low-calorie alternatives always preferable? Are breakfast cereals really good for you? 6. Pupils critically assess the sources of secondary data, and use selected sources for a purpose. 7. Using a model such as a sieve with chickpeas and sand may also help some pupils to understand the absorption of nutrients. Children use interlocking beads and / or Lego models to represent large complex (starch) and small simple (sugar) molecules to model the process of breakdown of molecules. Children follow the path of water through the body by demonstrating the steps of digestion. 8. investigate the roles that water plays in keeping us alive.

Pictures / Diagrams	❑ Modelling the composition of blood; blood vessel (plastic bottle), plasma (water, yellow food colouring, pinch of salt (represents minerals)), red blood cells (Cheerios and red food colouring), white blood cells (mini marshmallows) and platelets (mini pom poms). ❑ Show a diagram which represents the double circulatory system that humans. ❑ Arrange cards with names of parts of the circulatory system in the correct order. ❑ Identify and classify which carry blood containing oxygen and those which transport blood without oxygen. ❑ Recreate the journey, in the playground, dressed in red (to represent the blood) on a large scale version drawn on the playground. Children follow the path and model the series of events, donating their red jumping leaving blue tops underneath when they reach the lungs and picking them up again on their next visit. ❑ Create a model circulatory system What could you change about your circulatory system in order for the ”blood” to flow to the cells more quickly? How about more slowly? How does the size of your pipes affect the speed of blood flow? ❑ Children examine different circulation systems to identify and classify similarities and differences. ❑ Create a comic strip to illustrate the job carried out by different white blood cells. Write a paragraph to explain what is happening in the diagram. ❑ Research the work of Galen and William Harvey and produce a report.

	❑ Explain why William Harvey's ideas about the circulatory system were accepted as fact over ideas by other scientists. ❑ Explain why the ideas of previous scientists, e.g. Galen were dismissed in favour of Harvey's. ❑ Ask children to compare and contrast a water park to the circulatory system by using a Venn Diagram. ❑ Describe and identify differences from pictures of the before and after effects of taking drugs, of different celebrities to identify visual signs of change.
Important People	❑ Alexander Fleming Alexander Fleming (2) ❑ Marie Curie ❑ Daniel Hale Williams

Evolution & Inheritance **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	Evolution, inheritance, adaptation, characteristics, variation
Key Facts	❑ Evolution is a process of change that takes place over evolution? many generations, during which species of animals, plants, or insects slowly change some of their physical characteristics. This is because offspring are not identical to their parents. ❑ It occurs when there is competition to survive. This is called natural selection. ❑ Difference within a species (for example between parents and offspring) can be caused by inheritance and mutations. ❑ Inheritance is when characteristics are passed on from generation to the next. ❑ Mutations in characteristics are not inherited from the parents and appear as new characteristics. How do we know about evolution? ❑ Evidence of evolution comes from fossils - when these are compared to living creatures from today, palaeontologists can compare similarities and differences. ❑ Other evidence comes from living things - comparisons of some species may reveal common ancestors.

	❑ Adaptation is when animals and plants have evolved so adaptation, e.g that they have adapted to survive in their environments. For example, polar bears have a thick layer of blubber under their fur to survive the cold, harsh environment of the Arctic while giraffes have long necks to reach the leaves on trees. ❑ Some environments provide challenges yet some animals and plants have adapted to survive there ❑ Sometimes adaptations can be disadvantageous. One example of this can be the dodo, which became extinct as it lost its ability to fly through evolution. Flying was unnecessary for the dodo as it had lived for so many years without predators, until its native island became inhabited.

	❑ When adaptations are more harmful than helpful, these are called maladaptations.
Investigate	1. Research palaeontologist Mary Anning and her discoveries in the UK and/or research the theory of Evolution- Charles Darwin- Darwin's finches. Explain how scientists accept or reject each other's ideas and evidence using peer review. 2. Describe how fossils are made- five different types 3. Investigate footprints and the best material to create one- sand, soil, mud, clay- will temperature or moisture affect the footprint? How can we preserve it? Assess the strength of evidence, deciding whether it is sufficient to support a conclusion. 4. Match the offspring to the parent- difficulty in using plants with their seeds and reptiles/birds with eggs. With regards to difficulty in using plants with their seeds and reptiles/birds with eggs, employ a systematic approach in deciding the relative importance of a number of scientific factors when explaining processes or phenomena. 5. Research cross breeding within dogs and discuss. Suggest economic, ethical/moral, social or cultural arguments for and against scientific or technological developments. 6. Children to investigate how to create different offspring of given parents 7. Investigate an animal such as Mammoth and how it has adapted over the years to become the elephant. Explain how ideas change as people working in science discuss new evidence. 8. Investigate a plant species that is still around today using secondary resources- how has it adapted to stay alive? Consider and weigh up all the evidence available.
Pictures / Diagrams	❑ Research time periods- Triassic/Jurassic/Cretaceous- create a timeline to show the same living thing and how it has changed. Explain how emerging evidence is helping to explain scientific theories. ❑ Sort animals/birds/plants into different periods of history. ❑ Sort pictures of fossils into groups based on structure/ features ❑ Sort the fossils based on type of fossil-mold/cast, carbon film, trace, preserved remains and petrified fossil ❑ Match animals to footprints- explain how you know? ❑ Children to make a list of their features and siblings- make a mind map to draw connections ❑ Create a probability diagram ❑ Research using secondary sources, books, Ipads and computers to find information about animals. Independently select the most useful ways to present qualitative and quantitative data. ❑ Create food chains and food webs based on habitats ❑ Create a branching key based on animal features. Select the most appropriate model to explain an idea.

	❏ Match predator teeth with the predator

	❏ Match prey teeth to the prey ❏ Match features/characteristics to the anima/plant- exotic animals and plants ❏ Create your own animal that is adapted to the school environment ❏ Look at the evolution of humans and the factors that influence their survival- match pictures to timeline. Explain how emerging evidence is helping to explain scientific theories.
Important People	❏ Charles Darwin Charles Darwin (2) ❏ Mary Leakey
Materials **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	solubility conductivity oxidisation sublimation helium hydrogen
Key Facts	***Revise key facts from KS2 prior learning.***
Investigate	
Pictures / Diagrams	
Important People	❏ Pierre Janssen and Norman Lockyer
Sound, Light, Earth and Space **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	transmission optics refraction geocentric + heliocentric model of the universe

Key Facts	❏ We need light to be able to see things. ❏ Light waves travel out from sources of light in straight lines. These lines are often called rays or beams of light. ❏ Light from the sun travels in a straight line and hits the chair. ❏ The light ray is then reflected off the chair and travels in a straight line to the girl's eye, enabling her to see the chair. ❏ The law of reflection states that the angle of incidence is equal to the angle of reflection. ❏ Whenever light is reflected from a surface, it obeys this law. ❏ The angle of reflection is the angle between the normal line and the reflected ray light. ❏ The angle of incidence is the angle between the normal line and the incident ray of light. ❏ Light travels as a wave. But unlike waves of water or sound waves, it does not need a medium to travel through. This means light can travel through

	a vacuum - a completely airless space. A spoon in water looks as if it is bent. This is because light bends when it moves from air to water. ❏ When light bends in this way, it is called refraction. Isaac Newton shone a light through a transparent prism, separating out light into the colours of the rainbow (red, orange, yellow, green, blue, indigo and violet) - the colours of the spectrum. ❏ All the colours together merge and make visible light.
Investigate	1. Allow children to investigate shadows with torches. Draw out the knowledge from Y3 about how shadows are formed and that different shadows have a depth of darkness depending on how much light is reflected. Darken the room: Hide one child behind something. Challenge a friend to capture their friend by illuminating them in the torch beam. The child with the torch must stand in the doorway. Discuss these statements… "They can't see each other because the torch isn't powerful enough." "They can't see each other because the darkness absorbs the light." "They can't see each other because light can't travel around corners." In what position in the room will the child with the torch see their friend? Why? Get the child to choose one place to stand in the room before they switch on the torch. You could play this game several times. 2. Give the children a torch and sheets of card with one hole punched in them. Get them to investigate how to move the cards so that light can pass through all the holes. 3. Show children the anatomy of the eye. Explain how the lens focuses light on the back of the eye, but the image is upside down. Try to focus light using lenses. 4. Experiment reflecting light off black, white and shiny surfaces. What do they notice? Test which materials are best at reflecting light: two pieces of card opposite each other held with blue tac. Shine a torch on one of the cards. Observe the light reflected onto the other card. Move the cards apart until you can no longer see any light reflected. Try this with different materials/colours attached to the first card. Record distance and display results as a bar graph. 5. Observe light travelling through water – why do objects look bent/distorted? Children to blow bubbles and observe light travelling through the bubble - Explain the concept of white light refraction and the colour spectrum. 6. Investigate making shadows with torches. Discus how the shape of the shadow is the same as the object. Experiment with the distance of the object from the surface it is casting a shadow. Which distance has the clearest shadow image? Challenge them to set up a fair test to investigate how distance from the surface affects sharpness of shadow. How will they record their results?

	7. Give the children a torch to represent the sun, cocktail umbrellas, blue tac and card rectangles. Explain that the rectangles are sun beds. Challenge them to work out where the umbrellas must be placed at different times of the day to shade the sunbeds. How will they record their findings to present them to the class? 8. Explore with mirrors and torches. Ask them to direct a torch beam using a mirror to different spots in the room. What do they notice about the angle of the mirror? Can the children use more than one mirror to view a mystery object or message on the table if they are underneath the table? What about a message/picture on their back? Ask the children to show the lights journey using arrows to show the direction of light from the torch, reflected off the mirrors and into the eye. 9. Hinge two mirrors together with tape or blue tac. Place an object in front of the mirrors and investigate the effect of increasing the angle between the mirrors on the reflection of the object. You could record angle against the number of images. 10. Investigate concave and convex mirrors and the effect on the image. (Use a shiny spoon if concave and convex mirrors are not available.) Make up mirrors are concave/car door mirrors convex. Having considered information from a variety of different sources, come up with a question or idea to investigate.
Pictures / Diagrams	❏ Using the knowledge they have gained through the above investigations, get the children to draw a diagram that proves that light travels in straight lines. Justify the selection of the model to explain an idea. ❏ Describe the journey of light so that the child with the torch can see the child hiding. You could use large card arrows to model their ideas. Model that light travels from the light source, reflects off an object and travels into the eye. Children can draw light journeys in different scenarios in their books using arrows or in small groups to model the journeys practically using arrows.
Important People	❏ Nicolaus Copernicus ❏ Becky Schroeder
Forces **PIXL PLANNING (SHARED LINK)**	
Key Vocabulary	simple/series/parallel circuits terminal voltage power current resistance wire types (plain, nichrome, copper, fuse, florist's)
Key Facts	❏ A terminal is a point of connection for closing an electric circuit. ❏ Voltage means the force of an electrical current. ❏ Current means the flow of electrical charge. ❏ Resistance means reducing the electric current flow through a material. ❏ Circuit symbols are used to represent different components in a circuit diagram.

Investigate	1. Select the appropriate equipment for an investigation. Use test results to make predictions to set up further comparative and fair tests. For example, comparing the brightness of a bulb with two different voltage cells could lead to the children investigating how increasing the voltage of the cell affects the brightness of the bulb? Make predictions with an explanation using some scientific ideas. Allow children the opportunity to make different circuits. Challenge them to make a circuit where bulbs can be controlled individually, rather than all together. 2. Provide children with an unknown component and allow the children to identify its use and research its symbol. Having considered information from a variety of different sources, come up with a question or idea to investigate using the component. 3. Plan a comparative investigation: how will the number of batteries affect the brightness of the bulb? Discuss with the children how they will keep their tests fair – i.e. keep the same components each time; only changing the number of batteries. 4. Observe the dependent variable, with the children deciding how they will do this, e.g. create a scale, compare to a control circuit, use a data logger. Ensure accuracy and reliability are considered. Propose scientific explanations for unexpected observations or measurements, making allowances for anomalies.
Pictures / Diagrams	❑ Record circuits made using scientific diagrams, including the appropriate symbols. ❑ Create circuits from provided diagrams. These circuit diagrams could be faulty. The children would then need to correct the circuit before redrawing their corrections accurately ❑
Important People	❑ Nikola Tesla Nikola Tesla (2) ❑ Alessandro Volta